Attachment No. 1

APPENDIX A
STATEMENT OF WORK

"Distributed Wind Turbine Competitiveness Improvement Project
Type Certification (>200m^2 and <1000m^2 RSA) - Round 5"

March 14, 2017

1.0 BACKGROUND

The U.S. Department of Energy (DOE) Energy Efficiency and Renewable Energy (EERE) Wind Energy Technologies Office (WETO) defines distributed wind (DW) in terms of technology application based on a wind project's location relative to end-use and power-distribution infrastructure, rather than on technology size or project size; thus, the distributed wind market includes turbines and projects of many sizes. Wind systems are characterized as distributed based on the following criteria:

- Proximity to end-use: wind turbines installed at or near the point of end-use for the purposes of meeting onsite load or supporting the operation of the local (distribution or micro) grid.
- Point of interconnection: wind turbines connected on the customer side of the meter or directly to the local grid.

NREL is positioned to support U.S. small and midsize wind turbine manufacturers that demonstrate a strong commitment to improving their ability to compete in the global distributed wind market space. Wind technology expertise available at NREL's National Wind Technology Center (NWTC) has been instrumental in the past in supporting technology improvements.

Through NREL, WETO sponsors a multifaceted wind energy research portfolio to assist the U.S. wind industry develop competitive, high-performance technology for global energy markets. One specific program objective is to increase the number of certified small and midsize wind systems and reduce the levelized cost of energy (LCOE) of turbines used in distributed electricity systems to be competitive with retail electricity rates. "The Distributed Wind Turbine Competitiveness Improvement Project (CIP) Type Certification – Round 5" is intended to contribute to these program objectives and increase the cost competitiveness of U.S. small and midsize wind turbine manufacturers in the global distributed energy market.

2.0 OBJECTIVE

The objective of the CIP is to expand U.S. leadership in the domestic and international wind turbine market sector by assisting U.S. manufacturers in either lowering the LCOE of wind turbines through component improvements and manufacturing process upgrades or obtaining certification for their wind turbines. An increase in the number of certified distributed wind turbines available for the U.S. market is another key objective. Although DW is not defined by size, this solicitation is focused on turbines with a size range of >200m^2 and <1000m^2 rotor swept area (RSA).

3.0 SCOPE OF WORK

Under this CIP, Subcontractor shall conduct work focused on type certification for turbines with a RSA between >200m^2 and <1000m^2. The work effort shall include all activities necessary to 1) complete the design basis evaluation, 2) complete the design evaluation, 3) conduct the type certification testing of the turbine, 4) complete the manufacturing evaluation, and 5) ensure the turbine receives all conformity statements and a final type certificate.

4.0 TASKS

The Subcontractor shall perform the work, conduct the meetings, comply with the technical requirements, and deliver the work products described herein, as minimum requirements. Type Certification consists of five key steps: Design Basis Evaluation, Design Evaluation, Type Testing, Manufacturing Evaluation, and Final Evaluation. NREL will make a go/no-go determination depending on the outcome of the Design Basis Evaluation. NREL will make a second go/no-go determination after the Design Evaluation is completed.

All turbine designs are eligible for consideration in this effort. Type certification testing must be conducted at a site approved by a qualified Certification and Verification Agency (CVA) such that the test results will be accepted. At the conclusion of the project, all test reports and conformity statements resulting from type certification shall be posted on NREL's Web site.

Task 4.1: Communications

The Subcontractor shall provide information to and engage in scheduled communications with the NREL Technical Monitor throughout the subcontract period of performance to include:

1) A summary of the contracted effort, void of business sensitive information, with the following information:
    a. Company name
    b. Company contact/Principal Investigator
    c. Project Title
    d. Approximate Start date/duration
    e. Estimated Project Budget
    f. Statement of Problem
    g. Proposed Solution
    h. Project Deliverables and Milestones
    i. Work to be performed
    j. Anticipated Benefits
    k. Collaborating Entities

2) Information on the work effort suitable for inclusion in NREL and DOE news articles, to include high-resolution photos relevant to the effort for inclusion in NREL's photo database and for public dissemination;

3) Participation in monthly conference calls with the NREL team; and,

4) Hosting site visits for DOE and NREL to discuss the subcontract work effort.

Task 4.2: Design Evaluation

This task shall be comprised of the Design Basis Evaluation and the Design Evaluation, as described in IEC 61400-22. The evaluations shall be conducted by the certifying body. Components of this task shall include the Design Basis Review, Design Basis Evaluation, and the Design Evaluation. A go/no-go determination will be made by NREL based on the Design Basis Evaluation. A go/no-go determination will also be made by NREL at the completion of the Design Evaluation. A copy of the conformity statements for both the Design Basis Evaluation and the Design Evaluation shall be provided to NREL.

Task 4.3: Turbine System Commissioning and Acceptance

After the successful installation of the turbine system, the Subcontractor shall complete the commissioning tests of the turbine system jointly with the test facility to ensure manufacturing quality, proper assembly, and absence of observable material defects and to verify functionality, safety, and performance characteristics, utilizing the commissioning checklist, to include equipment inspections, quality assurance checks, and acceptance tests that are typically required by the turbine system manufacturer. Typical commissioning activities include inspections and checkout of the turbine system operating characteristics. A letter report documenting the installation and commissioning shall be submitted to NREL. The letter report shall include documentation of approval to begin testing by the test facility.

Task 4.4: Type Testing

Type testing shall be conducted for certification, including but not limited to power performance, mechanical loads, safety and function, blade testing, and gearbox field test if applicable. The Subcontractor shall submit a conformity statement on all type testing completed, which will be posted on NREL's Web site.

Task 4.5: Post Test Review Meeting

Post-test review requirements shall be determined in consultation with the testing facility. A letter report of the requirements and a summary of the meeting shall be prepared and submitted to NREL. Copies of the test reports shall also be submitted to NREL. The Subcontractor shall adhere to the requirements of the test facility.

Task 4.6: Manufacturing Evaluation

The Subcontractor shall work with the certification body to support the completion of the manufacturing evaluation and shall submit the manufacturing evaluation conformity statement.

Task 4.7: Final Evaluation Type Certificate

The Subcontractor shall work with the certification body to obtain type certification. The type certificate shall be submitted to NREL as completion of this task.

5.0 REVIEW MEETINGS AND TRAVEL REQUIREMENTS

The Subcontractor may, but is not required to, travel to NREL one or more times to discuss the project progress or to facilitate technical support from NREL. Conference calls and or in-person meetings may be conducted over the course of the subcontract period of performance, and shall be scheduled by either the Subcontractor or the Technical Monitor on an as-needed basis and as mutually agreed to.

6.0 DELIVERABLES

The Subcontractor shall provide the following deliverables to NREL:

6.1 The Subcontractor shall submit a summary of the contracted effort, void of business sensitive information, as described in Task 4.1**. Due: one (1) month from date of subcontract execution**.

6.2 The Subcontractor shall submit a copy of the Design Basis Evaluation Summary Letter Report from the certifying body, as defined in Task 4.2. **Due: two (2) months from date of subcontract execution.**

6.3 The Subcontractor shall submit a copy of the Design Basis Evaluation conformity statement. as defined in Task 4.2. **Due: four (4) months from date of subcontract execution.**

6.4 The Subcontractor shall submit a copy of the Design Evaluation conformity statement, as defined in Task 4.2. **Due: ten (10) months from date of subcontract execution.**

6.5 The Subcontractor shall submit a letter report documenting the successful installation of the turbine, procedures for testing, and the signed Commissioning report, as defined in Task 4.3. **Due: twelve (12) months from date of subcontract execution**.

6.6 The Subcontractor shall submit a conformity statement on all type testing completed including but not limited to power performance, mechanical loads, safety and function, blade testing, and gearbox field testing, if applicable, as defined in Task 4.4. **Due: seventeen (17) months from date of subcontract execution**.

6.7 The Subcontractor shall submit a letter report documenting the post-test review meeting along with copies of the test reports, as defined in Task 4.5. **Due: eighteen (18) months from the date of subcontract execution**.

6.8 The Subcontractor shall submit the manufacturing evaluation conformity statement, as defined in **Task 4.6. Due: nineteen (19) months from date of subcontract execution**.

6.9 The Subcontractor shall submit a copy of the type certificate, as defined in Task 4.7. **Due: twenty (20) months from date of subcontract execution**.

6.10 Quarterly Reports: The Subcontractor shall provide quarterly reports to include a description of work performed by the Subcontractor. The report shall describe the status, explain variances and problems and report on accomplishments. **Due: Quarterly from execution of award**.

DELIVERY OF COMPUTER SOFTWARE CODE (AS APPLICABLE)

All object, source, or other code (including all applicable data sets) developed under this subcontract effort shall be provided to the technical monitor as a condition of final payment, in accordance with the subcontract. It is expected that all delivered source code shall be original and the subcontractor shall provide a written certification to the subcontract associate that all source, or other code developed and delivered under this subcontract does not contain any open source code - as a condition of final payment in accordance with the subcontract. The subcontractor's (including all lower tier subcontractors, as applicable) certification shall specify that "All source, or other software code developed and/or delivered under this Subcontract No._____ is original and does not contain any 3rd party or other open source software."

7.0 ELECTRONIC REPORTING REQUIREMENTS FOR SUBCONTRACT REPORT DELIVERABLES

It is NREL's intention to publish subcontract report deliverables containing publicly available information (e.g. non-confidential, non-protected, non-proprietary information) for distribution on the internet.

The subcontractor shall provide the final approved version of report deliverables in accordance with the electronic reporting requirements described below.

The technical monitor may specifically direct the subcontractor to provide reports in one or more of the file format standards provided below.

a. The subcontractor shall submit all report deliverables (including status, annual, or final reports) as electronic files in Adobe .pdf format, preferably with all graphics and images embedded within the document.

b. All final approved version submissions shall be delivered to NREL via e-mail to the 1) NREL Technical Monitor, 2) the NREL Subcontract Administrator or Associate (as specified in the Deliverable Addresses below).

c. If it is not possible to include all of the graphics and images (figures, illustrations, and photographs) in the same file as the text, NREL will accept the text in Adobe .pdf formats and the graphics and images as separate electronic graphic or image files*. The accepted standard for page layout and graphics is the Adobe Creative Suite of programs.

*The acceptable graphic or image file formats are: .eps, .tif, .gif, .jpg, .wmf, .emf, .pct, .png, .bmp, .psd, .ai, .fh, .qif, .fpx, cdr. The preferred resolution for graphics or images is 300 dpi. Include all fonts used in creating the file.

d. For animation, video, or multi-media elements, CD-ROM, DVR and thumb drive are acceptable technical deliverable media.

e. For all calculations in support of subcontract reports that are conducted in ASPEN+, an electronic copy of INPUT, REPORT and BACKUP (if Model Manager is used) must be submitted with all reports. Additionally, if costing or sizing calculations are conducted in a spreadsheet [no process calculations (heat and material balances) in spreadsheet format are permitted], a copy of the fully documented MS Excel file shall be supplied.

f. A fully executed model release shall be supplied to NREL with all photographs and images, regardless of whether such photographs or images are delivered to NREL electronically or in hard copy. Such model release shall certify that the Alliance for Sustainable Energy, LLC, Management and Operating Contractor for the National Renewable Energy Laboratory for the U.S. Department of Energy is granted a non-exclusive, paid-up, irrevocable, worldwide license to publish such photographs in any medium or reproduce such photographs or allow others to do so for United States Government purposes. Model releases are required in all situations in which a reasonable person would respond in the affirmative to the question – could someone, other than the model himself/herself, recognize the person in this photograph or image? All model releases shall be provided to the subcontract associate as a condition of final payment, in accordance with the subcontract. To obtain a Subcontractor Model Release form, please contact images@nrel.gov.

8.0 ACKNOWLEDGEMENTS IN SUBCONTRACTOR PUBLICATIONS

In any scientific or technical report or article, conference paper, journal article, etc. based on or containing data first produced in the performance of this subcontract and published in academic, technical or professional journals, symposia proceedings or similar works, the subcontractor shall use this acknowledgement stating, "This [article, conference paper, journal article, etc.] was developed based upon funding from the Alliance for Sustainable Energy, LLC, Managing and Operating Contractor for the National Renewable Energy Laboratory for the U.S. Department of Energy."

9.0 COPYRIGHT PERMISSION/AUTHORIZATIONS

The subcontractor is responsible for obtaining copyright permissions and/or authorizations for all information and/or data, as applicable that is incorporated into all final technical reports. Electronic copies of these copyright permissions and/or authorizations shall be provided to the subcontract associate at the email address provided below. The subcontractor shall also provide a written certification to the subcontract associate as to such permissions and/or authorizations as a condition of final payment. The subcontractor's (including all lower tier subcontractors, as applicable) certification shall specify that "I have obtained all necessary and legally required copyright permissions and/or authorizations for any and all information, data, graphs, images, etc., as applicable, that is incorporated into the final Technical Report titled _____, delivered under this Subcontract No._____. Copies of these permissions and/or authorizations are attached."

Deliverable Addresses:

The subcontractor shall clearly label all deliverables to include:

- The subcontractor's name
- NREL's subcontract number
- NREL Technical Monitor's name
- Deliverable date, and
- Deliverable description.

Deliverables shall be sent via email to each of the following addresses:

1) **, Technical Monitor
   National Renewable Energy Laboratory
   15013 Denver West Parkway
   Golden, CO 80401
   e-mail: **
   - One (1) master electronic version, including graphics

2) **, Subcontract Associate
   National Renewable Energy Laboratory
   15013 Denver West Parkway
   Contracts and Business Services
   Golden, CO 80401
   e-mail: **
   - One (1) master electronic version, including graphics